

# Abhijeet ANAND, PhD

## PERSONAL DATA

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CITIZENSHIP & VISA STATUS Indian [J-1 (Research Scholar)  
CURRENT ADDRESS: Lawrence Berkeley National Lab, Berkeley, CA, USA.  
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## EMPLOYMENT

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Sep 2022- Postdoctoral Scientist/Researcher  
[Dark Energy Survey Instrument \(DESI\) Group](#)  
Lawrence Berkeley National Lab, Berkeley, CA, USA.  
Aug 2022 Postdoctoral Fellow  
Max Planck Institute for Astrophysics (MPA), Garching, Germany.  
Sep 2017- Junior Research Fellow (JRF), University Grants Commission, Govt. of India  
Jul 2018 National Institute of Advanced Studies, Bangalore, India.

## EDUCATION

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Sept 2018- Ph.D. in ASTROPHYSICS (with *magna cum laude*)  
Jul 2022 **Ludwig-Maximilians-Universität (LMU) - MPI for Astrophysics (MPA)**, Garching, Germany.  
Thesis: “[Probing cool and warm circumgalactic gas in galaxies and clusters with large spectroscopic and imaging surveys.](#)”  
Advisors: Prof. Dr. Guinevere KAUFFMANN, MPA, & Dr. Dylan NELSON, ITA/ZAH, Univ. of Heidelberg.  
Jun 2016- Master of Science (MS) in PHYSICS, **Indian Institute of Science (IISc), Bangalore**, India.  
Jul 2017 Thesis: “[A sensitive search for HI 21 cm in superdisks of large radio galaxies.](#)”  
Advisor: Prof. Nirupam Roy, Indian Institute of Science (IISc), Bangalore.  
Aug 2012- Bachelor of Science (BS) in PHYSICS, **Indian Institute of Science, Bangalore**, India.  
May 2016 Thesis: “[Sources of Continuum Opacity in Hydrogen deficient stars.](#)”  
Advisor: Prof. Gajendra PANDEY, Indian Institute of Astrophysics (IIA), Bangalore.

## RESEARCH INTERESTS

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- Galaxy formation and evolution, cosmic baryon cycle, quasar absorption lines
- astronomical data analysis, statistical methods, large spectroscopic and imaging surveys

## SCIENTIFIC PUBLICATIONS

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See my publications on [ADS](#) (*h-index* = 5, *Total citations* = 89) or [Google Scholar](#).

- LEAD OR SIGNIFICANT CONTRIBUTION: (FIRST AUTHOR: 3)  
2023 Napolitano, L., Pandey, A., Myers, A., Lan, T-W., **Anand, A.**, et al. “Detecting and Characterizing Mg II absorption in DESI Survey Validation Quasar Spectra” *AJ*, 166, 99.  
2023 M. Reza Ayromlou, G. Kauffmann, **A. Anand**, S.D.M White “The Physical Origin of Galactic Conformity: From Theory to Observation” *MNRAS*, 519, 1913.  
2022 **A. Anand**, G. Kauffmann, D. Nelson “Cool circumgalactic gas in galaxy clusters: connecting the DESI legacy imaging survey and SDSS DR16 Mg II absorbers” *MNRAS*, 513, 3210.  
2021 **A. Anand**, D. Nelson, G. Kauffmann, “Characterizing the abundance, properties, and kinematics of the cool circumgalactic medium of galaxies in absorption with SDSS DR16”, *MNRAS*, 504, 65.  
2019 **A. Anand**, N. Roy, Gopal-Krishna, “Search for H I emission from superdisk candidates associated with radio galaxies”, 2019, *Res. Astron. Astrophys*, 19, 083.

- PUBLICATIONS (COLLABORATION AND WHITE PAPERS)

- 2023 Han et al. (including A. Anand) “NANCY: Next-generation All-sky Near-infrared Community survey” [white paper, submitted, [arXiv](#)].
- 2023 DESI Collaboration, (including A. Anand) “The Early Data Release of the Dark Energy Spectroscopic Instrument” [A] submitted, [arXiv](#).
- 2023 DESI Collaboration, (including A. Anand) “Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument” [A] submitted, [arXiv](#).

- IN PREPARATION CURRENT PROJECTS

- 2023 Anand et al. “Multiphase circumgalactic gas in quasars: connecting the SDSS DR16 quasars and metal absorbers”
- 2023 Anand et al. “A novel galaxy archetype approach to model DESI galaxy spectra and their redshift estimation”

## PROFESSIONAL SERVICES, MENTORSHIP, COLLABORATION

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Referee	<a href="#">Astronomy &amp; Astrophysics</a>
Collaboration	Core member of DESI Data team, Core member of NANCY
Collaborators	J. Guy (LBL), S. Bailey (LBL), J. Moustakas (Siena College), G. Kauffmann (MPA Garching) D. Nelson (Heidelberg), M. Ayromlou (Heidelberg), T. Naab (MPA Garching)
Mentorship	Corey Dodeson (UG student, UC Berkeley): CGM Review Paper reading Dylan Green (PhD, UC Irvine as a part of DESI mentorship programme) Joanne Tan (PhD, MPA Garching): Working on simulations of ISM and CGM.

## COMPUTER SKILLS & CONTRIBUTIONS

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Developer:	<a href="#">desihub team</a> <ul style="list-style-type: none"><li>• Member of <a href="#">DESISPEC AND REDROCK</a>: Spectral analysis and redshift fitting code to process millions of spectra and images of galaxies.</li></ul>
Programming:	<b>Python</b> <ul style="list-style-type: none"><li>• Working on a novel method to generate physical models of galaxies and use them to model the observed spectra and measure their redshifts.</li><li>• Designed a novel pipeline to model quasar continuum based on Non-negative matrix factorization (NMF) method.</li><li>• Developed an automated detection pipeline to search for absorption features in astronomical spectra, using a matched kernel convolution and adaptive S/N technique.</li><li>• Wrote spectral fitting module to estimate the strength of absorption lines and their uncertainties based on the bootstrapping method.</li><li>• Designed fast and efficient scripts to cross-correlate objects in sky and use them for science results.</li></ul> <b>Matlab</b> <ul style="list-style-type: none"><li>• Have used differential equation solvers such as RK-4 to solve coupled differential equations, like pendulums, neuron modelling.</li></ul>
Packages/Tools:	NumPy, Matplotlib, SciPy, Astropy, Jupyter notebooks, Slurm manager, <a href="#">Github</a>
OS/Applications:	Windows, Linux, Mac, $\text{\LaTeX}$ , Bash scripting

## SELECTED VISITS, TALKS AND CONFERENCES

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*\*Invited Visits/Talks, \*\* Schools & Workshops*

- \*AUG 2023 DESI Data Systems and Management Meeting, Aug 29, 2023 (*Virtual Talk*).
- JUL 2023 DESI Collaboration Summer Meeting, Durham, UK, Jul 17 - Jul 21, 2023 (*Talk*).
- \*MAR 2023 DESI Absorber Science Workshop, Mar 28, 2023 (*Virtual Talk*).
- DEC 2022 DESI Collaboration Winter Meeting, Cancun, Mexico, 5-9 Dec, 2022 (*Talk*).
- SEP 2022 [What matter\(s\) around galaxies 2022](#), Champoluc, Italy, 12-16 Sep, 2022 (*Virtual*).
- \*MAY 2022 [Gas Flows around Galaxies](#), MPA, Garching, 24 May, 2022 (*Talk*).
- APR 2022 [Galaxy Clusters 2022](#), STScI 25-29 Apr, 2022 (*e-Poster*).

- \*MAR 2022 [Computational Galaxy Formation and Evolution Group](#), ZAH/ITA, University of Heidelberg, 14-16 Mar, 2022 (*Visitor*).
- \*FEB 2022 High Energy Group Seminar, MPE Garching, 15 Feb, 2022 (*Virtual*).
- \*FEB 2022 DESI Group Seminar, Berkeley Lab, 1 Feb, 2022 (*Virtual*).
- \*DEC 2021 [Galaxies & Cosmology Seminar](#), CfA Harvard, 13 Dec, 2021 (*Virtual*).
- \*SEP 2021 *STARs lab*, Arizona State University, 24 Sep, 2021 (*Virtual*).
- NOV 2021 *e-Poster, short talk, KooGiG-Junior'21*, KIAA, Peking University, 1-5 Nov, 2021 (*Virtual*).
- SEP 2021 [German Astronomical Society Meeting 2021](#), 16 Sep, 2021 (*Virtual*)
- AUG 2021 [SDSS-IV Collaboration Meeting 2021](#), 12 Aug, 2021 (*Virtual + e-poster*)
- \*\*JUL 2021 MIAPP Workshop: High-Energy Plasma Physics Phenomena in Astrophysics, MIAPP, Garching, Jul 19 - 30, 2021 (*Virtual participant*).
- JUN 2021 MPA Galaxy Group Retreat, Fraueninsel, Chiemsee, 14-17 June, 2021 (*Talk*).
- \*\*JAN 2021 Fundamental of Gaseous Halos, KITP, UCSB, 11 Jan - 5 Mar, 2021 (*Virtual participant*).
- OCT 2020 Galaxy Introductory Symposium, MPA, Garching, 27 Oct, 2020 (*Virtual*).
- OCT 2020 Institute Seminar, MPA, Garching, 26 Oct, 2020 (*Virtual*).
- OCT 2019 [CGM 2019: CGM Conference](#), Berlin, 3 Oct - 5 Oct 2019 (*Participation*).
- \*\*AUG 2019 SUMMER SCHOOL: Galaxy Formation, AKSS, Spetses, 28 Aug - 5 Sept 2019.
- \*\*NOV 2018 PYTHON for HPC, attended at MPCDF, Garching, 20-21 Nov 2018.

## AWARDS AND ACHIEVEMENTS

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	Total Prize Amount: (USD ~ 165,000)
JUL'23-DEC'23	DESI Early Career Scientist Travel Grant (USD 4000).
SEP'18 - JUL'22	IMPRS PhD Fellowship (Euros 141,500)
SEPT'17 - JUL'18	UGC <sup>1</sup> - Junior Research Fellowship (JRF), NIAS, Bangalore (INR 310,000).
AUG'12 - JUL'17	DST <sup>2</sup> -Scholarship, Indian Institute of Science, Bangalore (INR 300,000).
JUL'12	IIT-JEE <sup>3</sup> (ranked in top 0.5 %), AIEEE <sup>4</sup> (ranked in top 0.2 %).

## LANGUAGES

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ENGLISH: (Full professional proficiency), HINDI: (Mother tongue), GERMAN: (Basic Knowledge, A2.1)

## OUTREACH, TEACHING, LEADERSHIP ACTIVITIES

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- Organizing Committee, INPA Weekly Seminar, Physics Division, LBNL (Sept'23 -).
- My papers ([I](#), [II](#)) featured in monthly research highlight of MPA and appeared on [astrobites](#).
- Gave [interview](#) to [The Interview Portal](#) to help Indian college students plan their careers.
- Member of Local organizing Committee of VII<sup>th</sup> IMPRS Student Symposium, 4-5 Apr, 2019.
- Served as online physics tutor at E-acharya (more than 20 students)<sup>5</sup> from June 2017 - Aug 2018.
- Advanced Physics tutor at Chegg India from Jul 2016 - Dec 2017. Solving advance physics problems and clearing doubts of students from all over the world.
- Organized and coordinated scientific and technical workshops (~ 150 participants) in "Pravega"<sup>6</sup>, in Jan'14.
- Conducted experiments and demonstrations for open day celebration at IISc during my undergraduate.

Last updated on 2023-10-10

<sup>1</sup> University Grants Commission, Govt. of India    <sup>2</sup> Department of Science & Technology, Govt. of India    <sup>3</sup> Joint Entrance Examination for Indian Institute of Technology, among 0.5 million students    <sup>4</sup> All India Engineering Entrance Examination, among 1.2 million students.    <sup>5</sup> an initiative to help poor students in sub-urban and rural areas of Bihar, India.    <sup>6</sup> the Annual Science & Cultural Festival of the Indian Institute of Science.